WHAT IS CLAIMED IS:

1. An OFDM (Orthogonal Frequency Division Multiplexing) transmitting apparatus where serial input data is converted to parallel data blocks of length N, comprising:

a rotational sub-block partitioner for partitioning the input data block of length N into M, the number of sub-block, and distributing the partitioned data of length L (N/M) into M sub-blocks one by one rotationally;

M IFFTs (Inverse Fast Fourier Transformers) for performing L-point IFFT on the successive N/M data assigned to each M sub-block;

M coefficient multipliers for multiplying the N/M data output from each IFFT by predetermined coefficients to give orthogonality to the frequency components of the N/M data;

a phase factor optimizer for optimizing M phase factors to minimize a PAPR (Peak-to-Average Power Ratio) using the N/M output values of each coefficient multiplier;

M multipliers for multiplying the optimized M phase factors by the corresponding outputs of the coefficient multipliers; and

an adder for summing the outputs of the M multipliers on a symbol-to-symbol basis.

2. The OFDM transmitting apparatus of claim 1, wherein the predetermined coefficient for the M coefficient multipliers is $e^{2\pi mn/N}$ ($0 \leq m \leq M-1$, $0 \leq n \leq L-1$).

3. The OFDM transmitting apparatus of claim 1, wherein the predetermined coefficient for the M coefficient multipliers is $e^{-2\pi mn/N}$ ($0 \leq m \leq M-1$, $0 \leq n \leq L-1$).

4. The OFDM transmitting apparatus of claim 1, wherein (±1, ±j) are used as the phase factors.

5. An OFDM receiving apparatus for receiving a signal from an OFDM transmitting apparatus, comprising:

a correlator for separating a received signal into M sub-blocks using the orthogonality of frequencies in the signal;

a phase factor eliminator for multiplying the separated data of length L from each sub-block by a predetermined inverse phase factor;

M inverse coefficient multipliers for multiplying each of the output data with length L received from the phase factor eliminator by predetermined coefficients to eliminate orthogonal components from frequency components of the output data;

M FFTs (Fast Fourier Transformers) for performing L-point FFT on the output data with length L received from each inverse coefficient multiplier; and

a deinterleaver for deinterleaving the output data received from the FFTs to recover an original data of the received output data.

6. The OFDM receiving apparatus of claim 4, wherein the predetermined coefficient for the M inverse multipliers is $e^{2\pi mn/N}$ $(0 \leq m \leq M-1, 0 \leq n \leq L-1)$.

7. The OFDM receiving apparatus of claim 4, wherein the predetermined coefficient for the M inverse multipliers is $e^{-2\pi mn/N}$ $(0 \leq m \leq M-1, 0 \leq n \leq L-1)$.

8. An OFDM receiving apparatus for receiving a signal of which the peak power is decreased by performing L-point IFFT by

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\begin{aligned}
x_n^{(m)} &= \frac{1}{N}\sum_{k=0}^{N-1} X_k^{(m)} e^{j2\pi nk/N} \\
&= \frac{1}{N}\sum_{l=0}^{L-1} X_{Ml+m}^{(m)} e^{j2\pi n(Ml+m)/N} \\
&= e^{j2\pi mn/N} \cdot \frac{1}{N}\sum_{l=0}^{L-1} X_{Ml+m}^{(m)} e^{j2\pi nMl/N} \\
&= \frac{1}{M} e^{j2\pi mn/N} \cdot \frac{1}{L}\sum_{l=0}^{L-1} X_{Ml+m}^{(m)} e^{j2\pi nl/L}, \quad \begin{matrix} 0 \le n \le N-1 \\ 0 \le m \le M-1 \end{matrix}
\end{aligned}
$$

and using a predetermined coefficient multiplier, the apparatus comprising:

a correlator for separating a received signal into M sub-blocks using the orthogonality of frequencies in the signal;

a phase factor eliminator for multiplying the separated data with Length L from each sub-block by a predetermined inverse phase factor;

M inverse coefficient multipliers for multiplying each of the output data with length L of each sub-block received from the phase factor eliminator by predetermined coefficients to eliminate orthogonal components from the frequency components of the signal;

M FFTs for performing L-point FFT on the output data with length L received from each inverse coefficient multiplier; and

a deinterleaver for deinterleaving signals received from the FFTs to recover an original signal of the received signal.

9. A method of transmitting an OFDM signal from an OFDM transmitting apparatus, comprising the steps of:

dividing serial data to be transmitted into data blocks of length N;

distributing the data of the divided data block of length N to M sub-blocks one by one rotationally;

performing L(N/M)-point IFFT on distributed N/M data assigned to each M sub-block;

multiplying the N/M data output from each IFFT by predetermined coefficients to give orthogonality to the frequency components of the N/M output data;

generating optimal M phase factors to minimize a PAPR using the coefficient multiplication results;

multiplying the M optimized phase factors by the multiplication results; and

summing the products of the phase factors and the coefficient multiplication results on a symbol-to-symbol basis.

10. A method of receiving a signal from an OFDM receiving apparatus, comprising the steps of:

separating a received signal of length N into M sub-blocks using the orthogonality of frequencies in the signal;

multiplying the separated data of length L from each sub-block by a predetermined inverse phase factor;

multiplying each output data of length L from the M sub-blocks by predetermined coefficients to eliminate orthogonal components from frequency components of the output data;

performing L(N/M)-point FFT on the multiplied data of length L; and

deinterleaving the L-point FFT output data to recover an original data.

11. An OFDM transmitting apparatus, comprising:

a rotational sub-block partitioner for distributing parallel data blocks of length N to M sub-blocks one by one rotationally so that N/M data of length L is assigned to each sub-block;

M IFFTs for performing L(N/M)-point IFFT on the N/M data assigned to each of the M sub-blocks;

M coefficient multipliers for multiplying the N/M data output from each IFFT by predetermined coefficients to give orthogonality to the frequency components of the N/M output data;

a phase factor optimizer for generating M phase factors to minimize a PAPR using the output of each coefficient multiplier;

M multipliers for multiplying the optimized M phase factors by the outputs of

the coefficient multipliers; and

an adder for summing the outputs of the M multipliers on a symbol-to-symbol basis.

12. An apparatus of recovering original data in OFDM (Orthogonal Frequency Division Multiplexing) system, comprising:

a rotational sub-block partitioner for partitioning the input data block of length N into M, the number of sub-block, and distributing the partitioned data of length L (N/M) into M sub-blocks one by one rotationally;

M IFFTs (Inverse Fast Fourier Transformers) for performing L-point IFFT on the successive N/M data assigned to each M sub-block;

M coefficient multipliers for multiplying the N/M data output from each IFFT by predetermined coefficients;

M inverse coefficient multipliers for multiplying each output data of length L received from the phase factor eliminator by the inverse number of the predetermined coefficients transmitted from the M coefficient multipliers; and

M FFTs (Fast Fourier Transformers) for performing L-point FFT on the output data of length L received from the corresponding inverse coefficient multipliers.

13. A method of recovering original data in OFDM (Orthogonal Frequency Division Multiplexing) system, comprising the steps of:

distributing the input data of the data block of length N to M sub-blocks one by one rotationally;

performing L(N/M)-point IFFT on successive N/M data assigned to the corresponding M sub-blocks;

multiplying the N/M data output from each IFFT by predetermined coefficients;

multiplying each output data of length L from the M sub-blocks by inverse

number of the coefficients generated; and

performing L(N/M)-point FFT on the multiplied data of length L.